



# CNPC POWDER

SPECIALIZED IN POWDER MATERIALS

## THE POWDER OF DIAMOND TOOLS

Copper, Copper-Nickel,  
Iron, & Carbide-Based  
Alloys.

**Powdered metal in diamond tooling is widely used in the segment of diamond tool production called metal bonded tools. In the diamond tool industry metal powder forms metallic matrices that are diamond impregnated through different PM techniques. This production process accounts for a large portion of the overall market for bonded grit diamond tools.**

The selection of a metallic matrix should serve the basic functions as follows:

- The best balance between the abrasion of the matrix and the wear of the diamonds;
- A low sinter temperature minimizes the risk of damaging the diamonds during the production, and also helps to achieve lower energy costs;
- Achieve a suitable chemical interaction between diamonds and matrix to get a chemical as well as a mechanical bond.

The key factors that determine the choice of a particular powder includes:

- Chemical composition
- Alloying elements
- Particle size and distribution

**The right combination of above key factors will improve the properties of yield strength, toughness, and wear resistance. This helps to produce a tool without degrading the diamond during the sintering process.**



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The bonding material used in metal-bonded diamond tools can be Cu-based alloy, Co-Ni alloy, Fe-based alloy and carbide-based alloy. Bronze is a Cu-based alloy and is widely used in metal-bonded diamond tool manufacturing.

## Cu-Based Alloys

As a desire for replacements for Co-based binders developed with the rising demand for diamond tools from construction and extractive industries, other materials like Fe-based and Cu-based alloys have developed.

New materials and production techniques help meet needs and reduce costs for manufacturers. Though no one material will be best for all applications, Cu-based alloys have been a focus for material development owing to some special characteristics.

Cu alloys may be great alternatives because Cu and Cu alloys are easy to manufacture and have excellent thermal conductivity, electrical conductivity, and good corrosion and chemical resistances.

Cu alloys have shown they can develop a better bond between diamond and binder allowing for a more stable tool, and may help with the ductility and the rigidity of a tool's cutting segment.

**CNPC POWDER** produces a variety of high-quality powders to suit your needs. Our Cu powders are offered in both water and gas atomized forms and come in a variety of mesh sizes. Our Cu alloy powders like our Bronze and Brass also have broad production capacity and application potential.

The use of Brasses, Bronzes, and Cupronickels have various heat conducting applications. Brasses form a very important set of alloys as they greatly increase the Copper's strength with the addition of Zinc as well as creating a cost effective material.

Within the Brasses are Special Brasses, which are created with the addition of 1-10% of elements like Al, Fe, Mn, Ni, Si and Sn. These elements can improve a variety of characteristics. Al for example, can actually contribute to increases in strength and resistances to corrosion and oxidation.

Nickel improves material strength at high temperatures and also helps with corrosion.



The properties of some Cu-based alloys have become important options, while others have been mainstays of the diamond tooling industry. Overall Cu alloy powders are better as a metal bond for diamond tools and also have good properties in the fabrication of diamond tools

At **CNPC POWDER**, we provide you with a great selection of powders for your industry. Access our catalog and select the powder that best suits your needs for diamond tools.